

CLAIMS

1. A method, comprising acts of:

detecting a decrease in performance of a first host computer; and

automatically configuring a second host computer to provide additional computational

resources for the first host computer in response to the act of detecting.

2. The method of claim 1, wherein the first host computer is coupled to at least one first storage device that is accessible to the first host computer and in which data of the first host computer is stored, and wherein the act of automatically configuring the second host computer includes an act of:

replicating the data of the first host computer from the at least one first storage device to at least one second storage device that is accessible to the second host computer.

3. The method of claim 2, wherein the act of replicating the data is performed without the first host computer copying the data from the at least one first storage device.

4. The method of claim 3, wherein the act of replicating the data is performed without the second host computer copying the data to the at least one second storage device.

5. The method of claim 2, wherein the act of replicating the data is performed without the second host computer copying the data to the at least one second storage device.

6. The method of claim 2, wherein the act of replicating the data includes an act of replicating all of the data that is used by the first host computer and stored on the at least one first storage device to the at least one second storage device, and wherein the act of automatically configuring further includes acts of:

modifying a portion of the replicated data that corresponds to configurable parameters of the first host computer; and

bringing the secondary host computer on line using the replicated data and the modified portion of the replicated data.

7. The method of claim 6, wherein the act of modifying the portion of the replicated data includes an act of modifying the portion of the replicated data that corresponds to a network address of the first host computer to correspond to a different network address, the method further comprising an act of:

5        modifying a network director to redirect at least one communication addressed to the network address of the first host computer to the different network address.

8. The method of claim 6, wherein the act of modifying the portion of the replicated data includes an act of modifying the portion of the replicated data that corresponds to a network address of the first host computer to correspond to a different network address, the method further comprising an act of:

10        modifying a network director to redirect only communications addressed to the network address of the first host computer that do not modify the replicated data to the different network address.

15        9. The method of claim 6, wherein the act of automatically configuring the second host computer further includes an act of:

      shutting down the second host computer prior to the act of replicating.

20        10. The method of claim 2, wherein the first host computer is not identical to the second host computer, and wherein the act of replicating the data includes an act of:

      replicating only a portion of the data that is used by the first host computer and stored on the at least one first storage device to the at least one second storage device, the portion of the data corresponding to data of the first host computer that can be at least one of used and  
25        executed by the second host computer without modification.

11. The method of claim 2, wherein the act of replicating the data includes an act of replicating the data from the at least one first storage device that is located in a first storage system to the at least one second storage device that is located in a second storage system.

30        12. The method of claim 11, wherein the act of replicating the data includes an act of replicating the data across a network.

13. The method of claim 11, wherein the act of automatically configuring the second host computer further includes an act of:

modifying a network address of the second host computer to be different than a network address of the first host computer.

14. The method of claim 13, further comprising an act of:

modifying a network director to redirect at least one communication addressed to the network address of the first host computer to the network address of the second host computer.

15. The method of claim 2, wherein the act of automatically configuring further includes an act of:

transforming at least a portion of the replicated data of the first host computer for use with the second host computer when the second host computer is not identical to the first host computer.

16. The method of claim 2, wherein the act of automatically configuring further includes an act of:

bringing the second host computer on line using the replicated data of the first host computer.

17. The method of claim 16, further comprising acts of:

detecting an increase in the performance of the first host computer subsequent to the act of automatically configuring; and

shutting down the second host computer in response to the act of detecting the increase in the performance of the first host computer.

18. The method of claim 16, further comprising acts of:

detecting a further decrease in the performance of the first host computer subsequent to the act of automatically configuring the second host computer; and

automatically configuring a third host computer to provide additional computational resources for the first host computer in response to the act of detecting the further decrease in the performance of the first host computer.

5           19.     The method of claim 1, wherein the first host computer is coupled to a first storage system that includes at least one first storage device that is accessible to the first host computer and in which data of the first host computer is stored, wherein the second host computer is coupled to a second storage system that includes at least one second storage device that is accessible to the second host computer and in which data of the second host computer is stored, the second storage system mirroring the data of the second host computer that is stored on the at least one second storage device to at least one third storage device, and wherein the act of automatically configuring the second host computer includes acts of:

10                 shutting down the second host computer;  
                  discontinuing the mirroring of the data of the second host computer; and  
15                 replicating, subsequent to the act of discontinuing, the data of the first host computer from the at least one first storage device to the at least one second storage device.

20           20.     The method of claim 19, wherein the act of replicating the data includes an act of replicating all of the data that is used by the first host computer and stored on the at least one first storage device to the at least one second storage device, and wherein the act of automatically configuring further includes acts of:

                  modifying a portion of the replicated data that corresponds to configurable parameters of the first host computer; and

25                 bringing the secondary host computer on line using the replicated data and the modified portion of the replicated data.

30           21.     The method of claim 20, wherein the act of modifying the portion of the replicated data includes an act of modifying the portion of the replicated data that corresponds to a network address of the first host computer to correspond to a different network address, the method further comprising an act of:

                  modifying a network director to redirect at least one communication addressed to the network address of the first host computer to the different network address.

22. The method of claim 1, further comprising an act of:  
communicating the change in operation of the first host computer to a controller that is  
operatively coupled to a storage system and the first host computer;  
5 wherein the act of automatically configuring the second host computer is performed by  
the controller in response to the acts of detecting and communicating.

23. The method of claim 1, wherein the first host computer is coupled to a first  
storage system that includes at least one first storage device that is accessible to the first host  
10 computer and in which data of the first host computer is stored, the second host computer is  
coupled to a second storage system that includes at least one second storage device that is  
accessible to the second host computer and in which data of the second host computer is stored,  
and wherein the act of automatically configuring the second host computer includes acts of:  
shutting down the second host computer;  
15 making a backup copy of the data of the second host computer that is stored on the at  
least one second storage device; and  
replicating, subsequent to the act of making the backup copy, the data of the first host  
computer from the at least one first storage device to the at least one second storage device.

24. The method of claim 1, further comprising an act of:  
mirroring data of the first host computer that is stored on at least one first storage device  
that is accessible to the first host computer to at least one second storage device that is accessible  
to the second host computer;  
wherein the act of automatically configuring includes an act of discontinuing the  
25 mirroring of the data to the at least one second storage device in response to the step of  
detecting.

25. The method of claim 24, wherein the act of mirroring the data includes an act of  
mirroring all of the data that is used by the first host computer and stored on the at least one first  
30 storage device to the at least one second storage device, and the act of automatically configuring  
further includes acts of:

modifying a portion of the mirrored data that corresponds to configurable parameters of the first host computer in response to the act of discontinuing; and

bringing the secondary host computer on line using the mirrored data and the modified portion of the mirrored data.

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26. The method of claim 25, wherein the act of modifying the portion of the mirrored data includes an act of modifying the portion of the mirrored data that corresponds to a network address of the first host computer to correspond to a different network address, the method further comprising an act of:

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modifying a network director to redirect at least one communication addressed to the network address of the first host computer to the different network address.

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27. The method of claim 1, further comprising acts of:  
detecting a decrease in performance of a third host computer; and  
automatically configuring the second host computer to provide additional computational resources for the third host computer in response to the act of detecting.

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28. The method of claim 1, further comprising acts of:  
detecting a decrease in performance of a third host computer; and  
automatically configuring a fourth host computer to provide additional computational resources for the third host computer in response to the act of detecting.

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29. A computer system, comprising:  
a first host computer;  
a second host computer; and  
a controller, operatively coupled to the first host computer and the second host computer, that automatically configures the second host computer to provide additional computational resources for the first host computer in response to a decrease in performance of the first host computer.

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30. The computer system of claim 29, further comprising:

a relay that is operatively coupled to a power source, the second host computer, and the controller, the relay switching, in response to an instruction from the controller, between a first position in which power from the power source is not provided to the second host computer and a second position in which power from the power source is provided to the second host  
5 computer.

31. The computer system of claim 29, further comprising:  
a storage system that is operatively coupled to the first host computer and the controller, the storage system mirroring data of the first host computer from a first storage device to a  
10 second storage device that is accessible to the second host computer.

32. The computer system of claim 31, wherein the storage system is a first storage system, the computer system further comprising:  
a second storage system that is operatively coupled to the second host computer and the  
15 controller;  
wherein the first storage device is located in the first storage system and the second storage device is located in the second storage system.

33. The computer system of claim 32, wherein the first host computer is coupled to a  
20 first network having a first subnet address and the second host computer is coupled to a second network having a second subnet address that is different than the first subnet address.

34. The computer system of claim 33, further comprising:  
a network director, coupled to the first host computer and the controller, that redirects, in  
25 response to an instruction from the controller, at least one communication sent to a network address of the first host computer to a network address of the second host computer.

35. The computer system of claim 33, wherein the controller includes means for modifying a portion of the mirrored data that corresponds to a network address of the first host  
30 computer to correspond to a different network address.

36. The computer system of claim 29, further comprising:

a storage system that is operatively coupled to the first host computer and the controller, the storage system including a first storage device that stores data of the first host computer; wherein the controller includes means for replicating the data of the first computer from the first storage device to a second storage device that is accessible to the second host computer.

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37. The computer system of claim 36, wherein the storage system is a first storage system, the computer system further comprising:

a second storage system that is operatively coupled to the second host computer and the controller;

10 wherein the first storage device is located in the first storage system and the second storage device is located in the second storage system.

38. The computer system of claim 37, wherein the first host computer is coupled to a first network having a first subnet address and the second host computer is coupled to a second network having a second subnet address that is different than the first subnet address.

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39. The computer system of claim 38, further comprising:

a network director, coupled to the first host computer and the controller, that redirects, in response to an instruction from the controller, at least one communication sent to a network address of the first host computer to a network address of the second host computer.

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40. The computer system of claim 38, wherein the controller includes means for modifying a portion of the replicated data that corresponds to a network address of the first host computer to correspond to a different network address.

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41. The computer system of claim 36, wherein the controller further includes a transformation engine that transforms at least a portion of the replicated data for use by the second host computer.

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42. The computer system of claim 29, further comprising:

an agent that executes on a processor of the first host computer and monitors the performance of the first host computer.



43. The computer system of claim 29, further comprising:  
an agent that executes on a processor of the first host computer and notifies the controller  
of the decrease in performance of the first host computer.

44. The computer system of claim 29, further comprising:  
a storage system that is operatively coupled to the first host computer and includes a  
storage processor;  
wherein the controller executes on the storage processor of the storage system.

45. A computer system, comprising:  
a first host computer;  
a second host computer; and  
configuration means, coupled to the first host computer and the second host computer,  
for automatically configuring the second host computer to provide additional computational  
resources for the first host computer in response to a decrease in performance of the first host  
computer.

46. The computer system of claim 45, further comprising:  
a first storage device that is coupled to the first host computer and the configuration  
means, the first storage device storing data of the first host computer; and  
a second storage device that is coupled to the second host computer and the  
configuration means;  
wherein the configuration means includes means for replicating the data of the first host  
computer from the first storage device to the second storage device.

47. The computer system of claim 46, wherein the means for replicating includes  
means for replicating the data of the first host computer without either of the first host computer  
and the second host computer copying the data of the first host computer from the first storage  
device or to the second storage device.

48. The computer system of claim 46, further comprising

means for transforming at least a portion of the data replicated to the second storage device when the second host computer is not identical to the first host computer.

49. The computer system of claim 46, wherein the configuration means further  
5 includes:

means for modifying a network address of the second host computer to be different than a network address of the first host computer.

50. The computer system of claim 49, wherein the first host computer is located in a  
10 first network having a first subnet address and the second host computer is located in a second network having a second subnet address that is different than the first subnet address, the computer system further comprising:

a network director that is coupled to the first host computer and the configuration means;  
wherein the configuration means further includes means for modifying the network  
15 director to redirect at least one communication addressed to the network address of the first host computer to the network address of the second host computer.

51. The computer system of claim 45, further comprising:  
a third host computer that is coupled to the configuration means;  
20 wherein the configuration means includes means for automatically configuring the third host computer to provide additional computational resources for the first host computer in response to a further decrease in the performance of the first host computer.

52. A storage system for use with a first host computer and a second host computer,  
25 the storage system comprising:

a first storage device to store data of the first host computer; and  
a controller that is coupled to the first storage device;  
wherein the controller, when operatively coupled to the first host computer and the  
30 second host computer, automatically configures the second host computer to use the data of the first host computer and provide additional computational resources for the first host computer in response to a decrease in performance of the first host computer.

53. The storage system of claim 52, further comprising a storage processor;  
wherein the controller executes on the storage processor of the storage system.

54. The storage system of claim 52, further comprising:  
5 a second storage device that is coupled to the second host computer and the controller;  
wherein the controller includes means for mirroring the data of the first host computer  
from the first storage device to the second storage device.

55. The storage system of claim 54, wherein the storage system is a networked  
10 storage system that includes a first storage system and a second storage system, each coupled to  
a network, and wherein the first storage device is located in the first storage system and the  
second storage device is located in the second storage system.

56. The storage system of claim 55, wherein the controller includes means for  
15 modifying a portion of the mirrored data that corresponds to a network address of the first host  
computer to correspond to a different network address.

57. The storage system of claim 52, further comprising:  
a second storage device that is coupled to the second host computer and the controller;  
20 wherein the controller includes means for replicating the data of the first host computer  
from the first storage device to the second storage device.

58. The storage system of claim 57, wherein the means for replicating includes  
means for replicating the data of the first host computer without either of the first host computer  
25 and the second host computer copying the data from the first storage device or to the second  
storage device.

59. The storage system of claim 57, wherein the storage system is a networked  
storage system that includes a first storage system and a second storage system, each coupled to  
30 a network, and wherein the first storage device is located in the first storage system and the  
second storage device is located in the second storage system.

